

EXHIBIT 44

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW MEXICO**

DINÉ CITIZENS AGAINST RUINING)	
OUR ENVIRONMENT, et al.,)	Case No. 1:19-cv-00703
Plaintiffs,)	
v.)	DECLARATION OF
DAVID BERNHARDT, et al.,)	TERESA SEAMSTER
Defendants.)	

I, Teresa C. Seamster, declare as follows:

1. I am over 18 years of age and am competent to testify.
2. The information in this declaration is based on my personal experience and my review of publicly available information.
3. I am a Montessori administrator and early childhood educator (26 years). I have a B.A. in Community Studies (University of California, Santa Cruz) M.S. in Education, and ED.S. in Instructional Systems (Indiana University, Bloomington). My work includes establishing an AMS school (certified by the American Montessori Society) in Santa Fe, New Mexico, in 1990, which was awarded a Level 5 certification by NM Children, Youth and Families. Prior to working with young children, I was the Media and Communications Department head at San Juan College in Farmington, New Mexico, for three years. The department had approximately 90 students with about 40% attending from the Navajo Nation including from chapters near Chaco Canyon. As a member of the college and the community in the 1980s, my family and I visited, camped, attended weddings, graduations and ceremonies with students and parents in the Navajo

Nation, and saw the steady development of oil and gas well drilling in the rural areas south of Aztec and Bloomfield.

4. I have been asked by the Diné Citizens Against Ruining Our Environment, et al. (Plaintiffs) to prepare a declaration in support of a Motion for Temporary Restraining Order or Preliminary Injunction regarding the above-captioned case in the United States District Court, for the District of New Mexico. I understand that the Plaintiffs are asking the Court to stop oil and gas drilling and development on Applications for Permits to Drill (APDs) in the Greater Chaco area that the Bureau of Land Management approved between 2016 and the present.

5. I am a lifetime Sierra Club member and have been an elected officer with the Northern New Mexico Group for the past 10 years working extensively on family health concerns in communities near oil field development.

6. The rapid expansion of shale oil and gas production in 2014, and proposed Piñon Pipeline project through several Chaco communities drew immediate concern from residents and led to chapter resolutions to the Navajo Tribal Council calling for a moratorium on drilling and for a Health Impact Assessment (HIA) to be conducted.

7. In 2015, I helped form a Counselor HIA Committee and prepared reports to Bureau of Land Management on oil well impacts and community efforts to gather air quality information and record health symptoms. In 2018, we received approval by the Navajo Nation Human Research Board to conduct a Health Impact Assessment, and, I completed a 10-unit Collaborative Institutional Training Initiative (“CITI”) course for bio-medical research training and human subject protection through UNM Health Sciences Center. All members of a research

team involved in the design, conduct or reporting of human health research must complete this training.

8. In the past year, I have helped conduct research on air pollution and related health effects in the Navajo community of Counselor, NM, and am a lead author of the Counselor Health Impact Assessment (HIA) completed in January 2019. The HIA, is Part One of a two-part study: “A Cultural, Spiritual and Health Impact Assessment: of Oil Drilling Operations in the Navajo Nation area of Counselor, Torreon and Ojo Encino Chapters (January 15, 2019), by Counselor Health Impact Assessment – Hozhogo’na’ada Committee.”

9. To support my work conducting the HIA research I have reviewed numerous national health studies that draw a clear link between air pollutants such as VOCs, aromatic hydrocarbons, particulate matter, and ground level ozone that result from oil and gas development, and long-term health impacts to organs and body systems, including impacts to skin, eyes, sensory organs, the respiratory system, and the gastrointestinal system.¹ Birth outcomes for women exposed to benzene in the first trimester are a particular concern as prenatal neurological and heart defects usually require immediate surgery and are life-threatening.² Additionally, I have reviewed studies that raise concerns about groundwater contamination that can also result in adverse health outcomes.³ I am concerned that production of shale oil and gas

¹ See, e.g. Physicians for Social Responsibility and Concerned Health Professionals of NY, Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking, Fifth Edition, March 13, 2018.

² McKenzie, Lisa M., Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado, 122 Environmental Health Perspectives 412 (2014).

³ Esswein, Eric et al., Evaluation of Some Potential Chemical Exposure Risks during Flowback Operations in Unconventional Oil and Gas Extraction: Preliminary Results, 11 Journal of Occupational and Environmental Hygiene D174 (2014).

in the San Juan Basin is an escalating health threat to nearby communities as well permits multiply in residential areas and the process of hydraulic fracturing (fracking) and multiple wellheads in single horizontal drilling sites combine to release higher and higher levels of hydrocarbons.

10. Research done for the Counselor Health Committee by the Southwest Pennsylvania Environmental Health Project has shown that in homes located closer than 5 miles from one or more active wells, the operational emissions from wells, causes hazardous peak exposures and both acute and long-term symptoms that affect the lungs, heart, brain, cognitive system and skin.⁴

11. The Southwest Pennsylvania Environmental Health Project's *Counselor Chapter Air Quality Assessment Results* shows hazardous levels of PM 2.5 and contaminants such as 2-Propanol, Acetone, Chloromethane, Hexane, Methylene chloride, Trichloroethylene and Dichlorodifluoromethane continuously present in well emissions near homes.⁵ The presence of the carcinogen, formaldehyde, was detected at elevated levels at all four sites that were monitored at randomly chosen homes within 5 miles of wells throughout the community. Formaldehyde is a chemical agent used extensively for well maintenance and when emitted can be inhaled. Exposure can cause cough, sore throat, nosebleeds, and eye irritation. It can cause cancer of the nose and throat, and is harmful for children and adults with asthma, bronchitis or other breathing problems. <https://www.cancer.org/cancer/cancer-causes/formaldehyde.html>

⁴ Southwest Pennsylvania Environmental Health Project, *Counselor Chapter Air Quality Assessment Results* (August 2018) (attached as Appendix A).

⁵ See *id.*

12. Health surveys conducted by the Counselor Health Committee, over a three-month period in 2018, had 80 respondents who recorded 20 health issues with the highest recorded symptoms: Sinus problems, sore throat, cough, headache, fatigue and sleep disruption, itching or burning eyes, shortness of breath, nosebleeds and skin rash.⁶

13. I live in Santa Fe County but attend regular meetings at the three chapters, Counselor, Ojo Encino and Torreon, that took part in the Health Impact Assessment, as well as at the Lybrook Elementary School and Chaco Culture National Historic Park for legislative tours and symposiums. The air quality in the Chaco area varies, but meeting attendees often experience and complain of severe sudden headaches, nasal and eye irritation, and shortness of breath from nearby well emissions. I routinely experience severe localized (frontal) headaches after daylong meetings in Counselor, where the Chapter House is near several active wells, which persist for 8-10 hours after I return to Santa Fe. Painful eye redness and burning is another place-related symptom I often experience after these meetings.

14. Increasingly serious health impacts are anticipated as well density and proximity to homes and schools increases. Air quality standards for well operations are based on 8 hours of exposure, typically for workers. Residents who live within a mile or less of one or more wells can experience continuous exposure to toxic BTEX (benzene, toluene, ethyl benzene and xylene), hydrogen sulfide and formaldehyde at much higher cumulative levels. One example is the Lybrook Elementary School in Counselor that currently has over 30 wells operating within a 2-mile radius of school property. The population has dropped from 126 to 87 students since

⁶ See Counselor HIA Committee, *Air Quality Report Summary for Residents*, at 4 (2019) (Attached as Appendix B).

2015, and most families prefer to bus their children to Cuba. Concern for their children's long-term health and well-being is a top priority for the community residents.

15. I declare under penalty of perjury under the laws of the United States, 28 U.S.C. § 1746, that, to the best of my knowledge, the foregoing is true and correct.

Dated this 1st day of August 2019, from Santa Fe, NM.

A handwritten signature in black ink, reading "Teresa Seamster". The signature is written in a cursive, flowing style.

Teresa C. Seamster

APPENDIX A

to Teresa Seamster's Declaration

SOUTHWEST PENNSYLVANIA ENVIRONMENTAL HEALTH PROJECT

COUNSELOR CHAPTER AIR QUALITY

ASSESSMENT RESULTS:
Particulate Matter (PM_{2.5}) and
Volatile Organic Compounds
(VOCs)



Prepared by the Environmental Health Project
760 Chapel Street, New Haven, CT 06510

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Dear Counselor residents,

Thank you for your participation in the Environmental Health and air Monitoring. We are providing you with an analysis of the data collected from several Specks used in your community in April of 2018. With information from these monitors, we can provide an estimate of baseline outdoor air quality in your community for this time period. ***If you have any questions please do not hesitate to contact us at: sjoginpally@environmentalhealthproject.org or clewis@environmentalhealthproject.org.***

What is in this Report? This report gives a summary of results from community air monitoring. It shows how these results compare to other results that EHP has reviewed in New York, Ohio, California and Pennsylvania. Pages 3- 5 shows the community results for PM_{2.5} monitoring. You will also find results from nearby Volatile Organic Compounds (VOCs) sampling on pages 6-10. VOC samples, at four different locations, were collected near natural gas activity sites for a 24-hour period. Samples were collected on May 23rd and May 30th 2018.

OUTDOOR PM_{2.5} RESULTS:

The figures on page 4 (1A-E) show the range of results of PM_{2.5} monitoring for five components measured (Figure 1A-peaks per day, Fig. 1B-duration of peaks, Fig. 1C-time between peaks, Fig. 1D- baseline air quality, and Fig. 1E- accumulated particle matter) using **Speck** monitor data. **The results are shown in relation to the entire Speck monitor data reviewed so far at EHP. The PM_{2.5} data for this location indicate that majority of locations had a higher baseline levels and accumulated particle count.** Other variables like peaks per day, duration of peaks and time between peaks are either below or above the average. It is normal for peaks to occur occasionally, and there are many possible sources of these peaks. The use of wood stoves, outdoor barbeque and heating with wood in winter can be significant sources of these peaks (see recommendations for home air quality on page 11 for more information). The wind direction and wind speed from the natural gas activity site like drilling and compressor site or another nearby source could also affect these results.

We monitored for PM_{2.5} at eight residences/locations in your area. In the bar charts below, each blue dot represents the average results for outdoor air levels at one home. The red bar marks the average (median) of all results compiled by EHP.

Answers to questions from Counselor HIA Committee

How does Counselor compare with other communities being monitored by EHP?

Baseline PM_{2.5} levels in other communities are generally below 10 micrograms/meter³. 6 out of the 8 monitored locations in Counselor Chapter recorded levels between 10-25 micrograms/meter³, with only 2 locations reading at the lower average PM_{2.5} level. Also, the total particle count over the 32-day monitoring period was at or above average levels of accumulated PM_{2.5}.

Are Counselor's PM_{2.5} levels considered high?

Yes, because they are higher than average PM_{2.5} levels recorded at similar distances from oil wells in communities in New York, Ohio, California and Pennsylvania. Counselor is the first community in a southwestern state to be monitored by the SWPA Environmental Health Project.

What are some reasons for Counselor's higher levels of PM 2.5 and Formaldehyde?

- Many homes in Counselor are located closer than a mile to one or more operating oil and gas wells. The recommended setback distance between occupied structures and wells is now 6600', or 1¼ mile.
- Many homes are "downwind" of wells that emit Volatile Organic Compounds (VOCs) and Formaldehyde (which can be formed from methane emissions in the presence of sunlight) that can have harmful health effects on residents.
- Many homes are located on open plains with few trees that experience frequent wind often at high speed, which increases residents' exposure to greater levels of PM_{2.5}.

Figure 1A. Peaks per day: This dot plot shows the average number of large-scale changes (peaks) in air quality per day recorded by each Speck over a 32-day period. These results range from about 2 to 4 peaks per day.

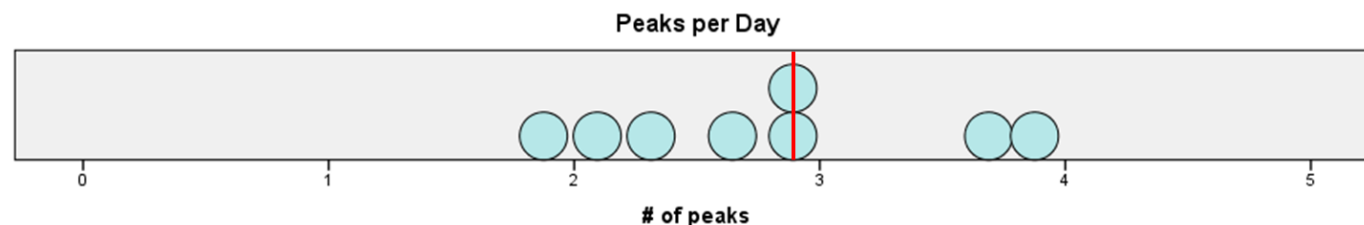


Figure 1B. Duration of peaks: This dot plot shows the average length of time peaks lasted. These results show a range from about 21 - 28 minutes per peak.

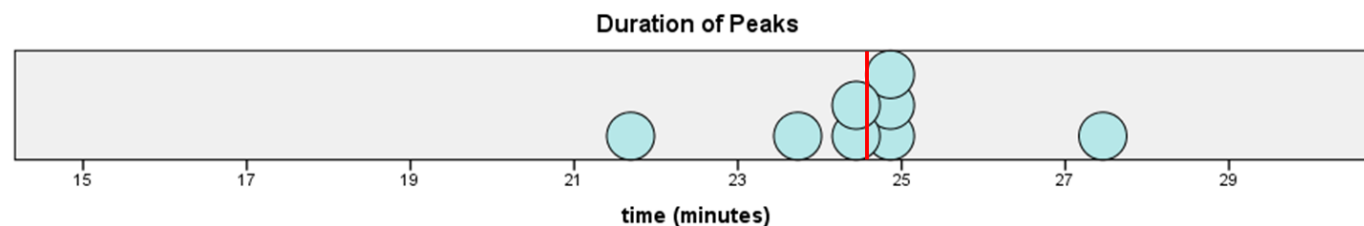


Figure 1C. Time between peaks: This dot plot shows the average length of time between peaks. The fewer the number of peaks, the greater the time period between peaks. These results range from about 6-13 hours, with three locations above average.

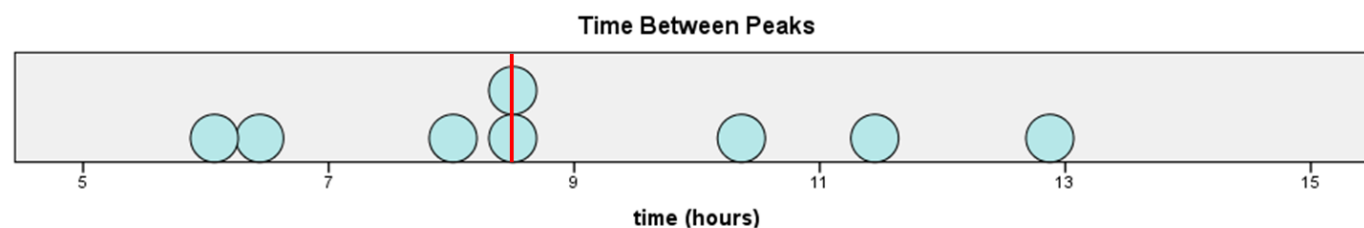


Figure 1D. Baseline air quality: This dot plot shows the level of particles generally found outside when peaks are not occurring.

These results show 6 locations being higher than average baseline outdoor air quality.

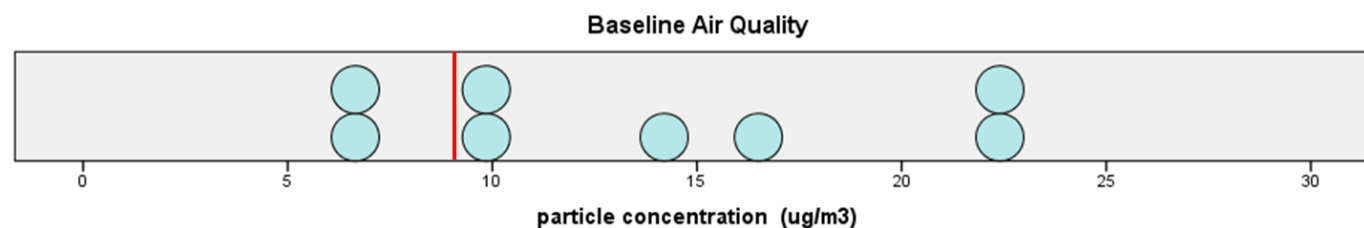
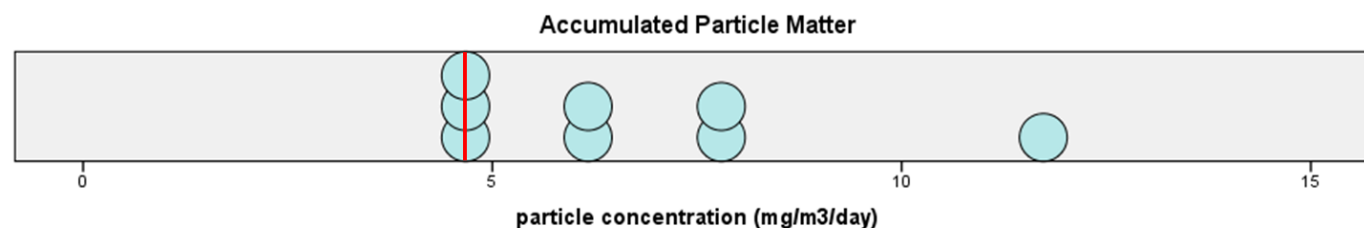
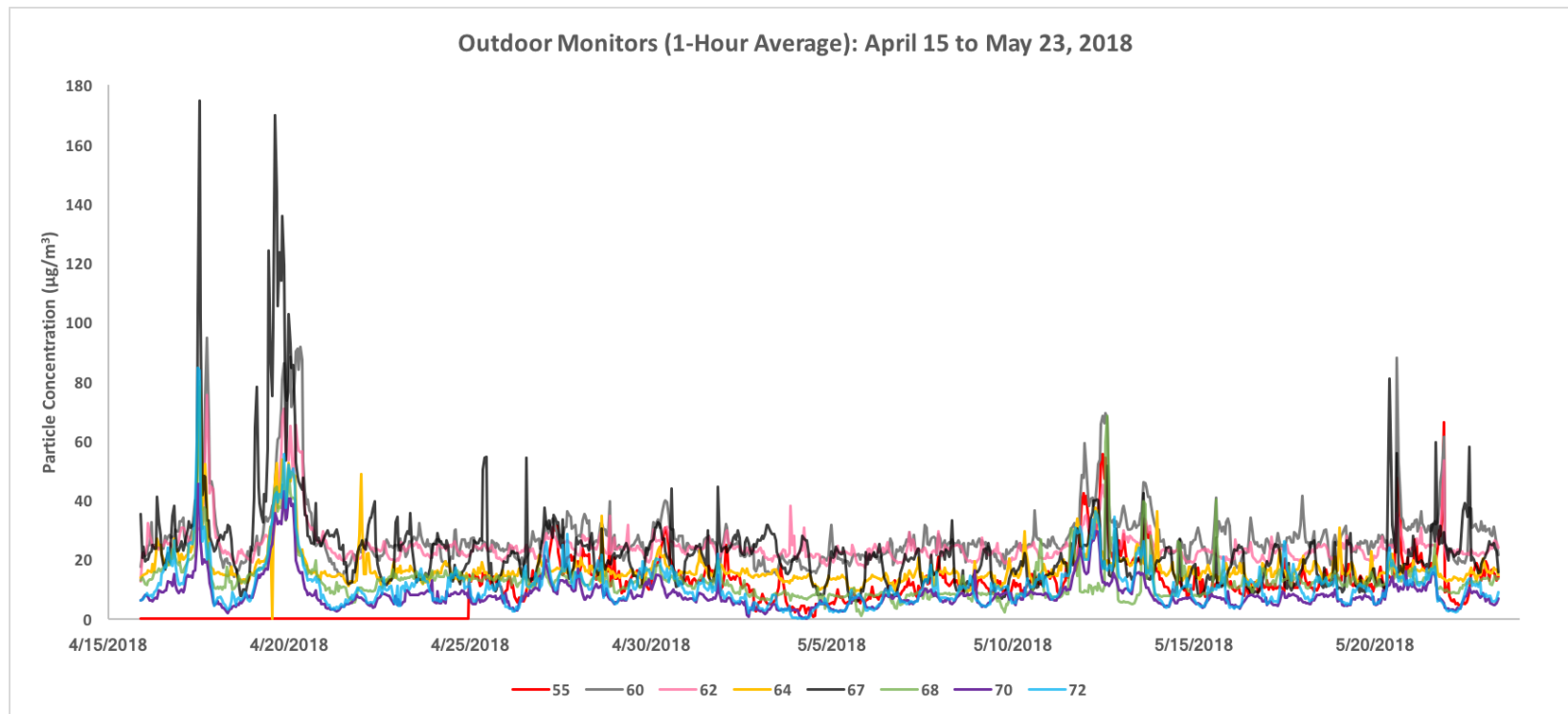


Figure 1E. Accumulated particle matter: This dot plot shows the total sum of particle counts over the 32-day period for each outdoor Speck. These results show a range at and above the average levels of accumulated PM2.5.



Figures 2 show the results from the eight outdoor Speck monitors placed in the community for 32 days. You can see that there were many times when peaks in PM_{2.5} exposure occurred simultaneously at various locations, most notably on 4/17 and 4/19. **If a source of air pollution is nearby, these conditions could cause increased exposure for residents. Chemicals from the source may combine with the particulate matter and travel to the deep regions of the lungs to cause respiratory problems or gain access to other parts of the body through blood-gas exchange.** Indoor Speck results have been provided to individual residents.

Figure 2 Outdoor PM_{2.5} results from 4 locations from April 15 – May 23, 2018



Monitoring for Volatile Organic Compounds (VOCs)

Using four summa canisters, you collected four 24-hour air samples and tested for 75 chemicals. The lab detected 3 on 5/23 and 7 on 5/30 of the 75 VOCs. Although exposure levels are below the threshold, we believe continued or longer duration of exposure to low levels may also significantly impact health. Table 1 shows which chemicals were found, potential health effect parameters and a color-coded analysis about the safety of this particular exposure. For each chemical identified there is a *threshold to consider action*. This is the level at which residents should be concerned about harmful exposure to a chemical. In this sample all chemicals were found at levels below what we think would cause immediate health effects. We still recommend taking action to limit your exposures (see recommendations at the end of the report) and providing this information to your Physician or primary health care provider. You also sampled for hydrogen sulfide and formaldehyde using separate badges. **No hydrogen sulfide was detected. Formaldehyde was detected at all sampling events at levels that have the potential to impact health. It is associated with incomplete fossil fuel combustion and can be formed from methane in the presence of sunlight.** Formaldehyde results are found in Table1.

Use the results key to quickly review the VOC results.

Use this key as your at-a-glance to quickly find items with an orange button that have the potential to impact your health or items with a red button that pose a significant and possible immediate concern for health.

RESULTS KEY








No action recommended due to no current health concern

Action recommended due to potential health concern








Immediate action strongly recommended due to significant and/or immediate health concern


Table1. Outdoor VOC readings in the community:Source: <http://www.atsdr.cdc.gov/mrls/mrlolist.asp>*Sample 1 collected on May 30th/2018*

Air Test Parameter	Threshold Source	Threshold to Consider Action*	Outdoor Air Test Result	Potential Health Effects of Parameter	Analysis
Acetone	ATSDR	26 ppm	3.6 ppbV (0.0036 ppm)	Neurological effects	
Chloromethane	OSHA	50 ppm (1.66 ppm)*	0.75 ppbV (0.00075 ppm)	Neurological and cardiovascular effects. May damage liver and kidneys.	
Dichlorodifluoromethane	NIOSH REL	1000 ppm (30 ppm)*	0.58 ppbV (0.00058 ppm)	Cardiovascular and Neurological effects	
Trichloroethene	OSHA	100 ppm (3.3 ppm)*	0.22 ppbV (0.00022 ppm)	Neurological and dermatological effects	
Formaldehyde	ATSDR	0.003 ppm	0.0085 ppm	Respiratory effects, carcinogen	

* Exposure limits from NIOSH are for an 8-hr workday schedule. EHP computes lower thresholds for residential areas for 24 hours of exposure, and also includes a calculation for vulnerable individuals including children and the elderly and others who may be more susceptible to these contaminants. These thresholds are found in parentheses, see Chloromethane (1.66ppm) for example.




Sample 2 collected on May 30th/2018


Air Test Parameter	Threshold Source	Threshold to Consider Action*	Outdoor Air Test Result	Potential Health Effects of Parameter	Analysis
Acetone	ATSDR	26 ppm	4.3 ppbV (0.0043 ppm)	Neurological effects	
Chloromethane	OSHA	50 ppm (1.66 ppm)*	0.69 ppbV (0.00069 ppm)	Neurological and cardiovascular effects. May damage liver and kidneys.	
Dichlorodifluoromethane	ATSDR	5 ppm (acute exposure) 0.06 (chronic exposure)	0.57 ppbV (0.00057 ppm)	Eye and throat irritation; possible carcinogen	
Hexane	ATSDR	0.6 ppm	0.56 ppbV (0.00056 ppm)	Neurological effects	
Methylene chloride	OSHA	25 ppm (0.83 ppm)*	2.9 ppbV (0.0029 ppm)	Neurological effects	

Formaldehyde	ATSDR	0.003 ppm	0.0070 ppm	Respiratory effects, carcinogen	
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* Exposure limits from NIOSH are for an 8-hr workday schedule. EHP computes lower thresholds for residential areas for 24 hours of exposure, and also includes a calculation for vulnerable individuals including children and the elderly and others who may be more susceptible to these contaminants. These thresholds are found in parentheses, see Chloromethane (1.66ppm) for example.





Sample 3 collected on May 23rd/2018




Air Test Parameter	Threshold Source	Threshold to Consider Action*	Outdoor Air Test Result	Potential Health Effects of Parameter	Analysis
Acetone	ATSDR	26 ppm	2.1 ppbV (0.0021 ppm)	Neurological effects	
Chloromethane	OSHA	50 ppm (1.66 ppm)*	0.69 ppbV (0.00069 ppm)	Neurological and cardiovascular effects. May damage liver and kidneys.	
Dichlorodifluoromethane	ATSDR	5 ppm (acute exposure) 0.06 (chronic exposure)	0.56 ppbV (0.00056 ppm)	Eye and throat irritation; possible carcinogen	

Formaldehyde	ATSDR	0.003 ppm	0.0090 ppm (Sampled on 05/30/2018)	Respiratory effects, carcinogen	
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* Exposure limits from NIOSH are for an 8-hr workday schedule. EHP computes lower thresholds for residential areas for 24 hours of exposure, and also includes a calculation for vulnerable individuals including children and the elderly and others who may be more susceptible to these contaminants. These thresholds are found in parentheses, see Chloromethane (1.66ppm) for example.

Sample 4 collected on May 30th/2018

Air Test Parameter	Threshold Source	Threshold to Consider Action*	Outdoor Air Test Result	Potential Health Effects of Parameter	Analysis
2-Propanol	OSHA	400 ppm (13.3 ppm)*	1.6 ppbV (0.0016 ppm)	Neurological and cardiovascular effects.	
Acetone	ATSDR	26 ppm	9.8 ppbV (0.0098 ppm)	Neurological effects	
Chloromethane	OSHA	50 ppm (1.66 ppm)*	0.71 ppbV (0.00071 ppm)	Neurological and cardiovascular effects. May damage liver and kidneys.	
Dichlorodifluoromethane	NIOSH REL	1000 PPM (30 ppm)*	0.57 ppbV (0.00057 ppm)	Eye and throat irritation; possible carcinogen	

Hexane	ATSDR	0.6 ppm	1.1 ppbV (0.0028 ppm)	Neurological effects	
Methylene chloride	OSHA	25 ppm (0.83 ppm)*	3.3 ppbV (0.00049 ppm)	Neurological effects	
Formaldehyde	ATSDR	0.003 ppm	0.0097 ppm	Respiratory effects, carcinogen	

* Exposure limits from NIOSH are for an 8-hr workday schedule. EHP computes lower thresholds for residential areas for 24 hours of exposure, and also includes a calculation for vulnerable individuals including children and the elderly and others who may be more susceptible to these contaminants. These thresholds are found in parentheses, see Chloromethane (1.66ppm) for example.

Recommendations for Checking the Home Environment for

The periods of exposure at your home could be related to a number of nearby sources or activities. Try to identify sources of emissions, both inside and outside your house. These may include:

- Non-Vented Kitchens and Bathrooms – Improved ventilation can decrease moisture in home which can result in condensation and mold, decreases odors, and improve air quality.
- Heating systems – The heating system in your home may be decreasing the air quality if your heating source is oil, kerosene, wood, propane, or coal. It may be adding to the level of fine particulate matter in your home and the air you breathe.
- Homes built before 1978 may have products that contain lead.
- Homes built before 1930, which have not been renovated, may have asbestos that if disturbed could cause illness.

- New furniture, carpet, vinyl flooring or refinished furniture may be high in formaldehyde, a chemical that is a probable carcinogen.
- Winterizing your home may increase the efficiency of your heating or cooling system, but it also has the potential to increase radon levels and increase the level of indoor air contaminants.
- Carbon monoxide detectors are recommended in any homes with gas, oil or wood fuel-burning appliances in case of accidental carbon monoxide poisoning.
- The use of pesticides or herbicides (bug or weed killers, flea or tick sprays, collars, powders, or shampoos) in your home, garden, or on your pets may pose a health concern.
- Pets in the home – Pets and other animals can increase the amount of dust and dander in a home and be a trigger for asthma.

Please see EHP's Recommendations for reducing exposures to air particles in your home at:

<http://www.environmentalhealthproject.org/health-issues/air>

If you have any questions, ***please do not hesitate to contact us via email or phone call.***

Thank you again for working with EHP

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Attachments (2)

Figure 1:

Map of 8 Monitoring locations in Counselor Chapter deployed during the week of April 8-15, 2018 and retrieved on May 23, 2018.

Figure 2:

Close up Map of location with highest levels of PM 2.5 showing wind speed and direction and intensity of PM 2.5 – ranging from lowest (blue) to yellow-green (which indicates the EPA level of PM 2.5 at 35 ug/m³, which can impact the respiratory health of individuals) to red (highest level of exposure and hazardous to human health).

Acronyms

US EPA United State Department of Environmental Protection

ATSDR Agency for Toxic Substances and Disease Registry of the Centers for Disease Control and Prevention

NIOSH National Institute for Occupational Safety and Health

OSHA Occupational Safety and Health Administration

PEL Permissible exposure limits

REL Recommended exposure limit

µg/m³ Micrograms per cubic meter → air quality measurement

ppm parts per million

ppb parts per billion

APPENDIX B

to Teresa Seamster's Declaration

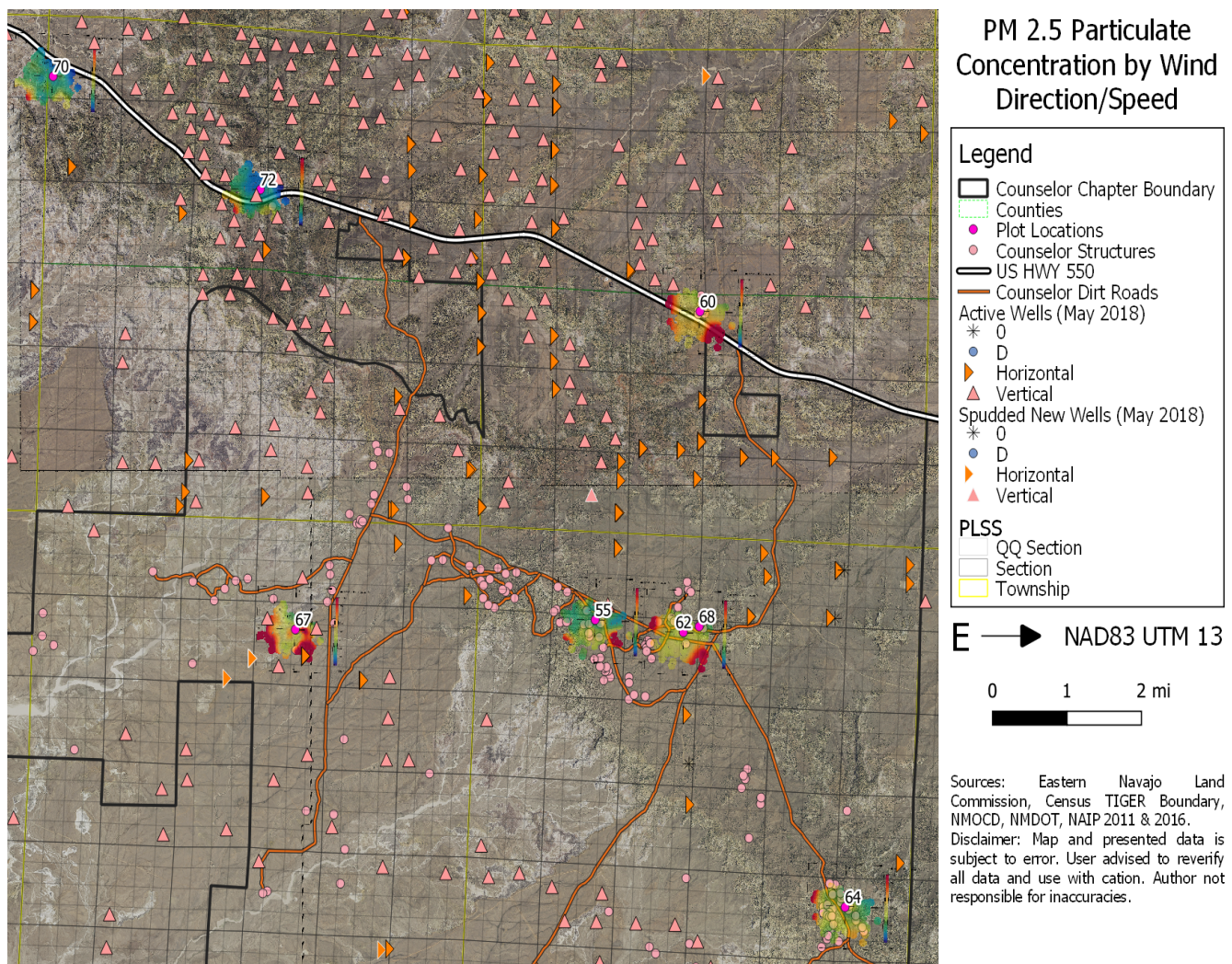
Air Quality Report Summary for Residents

The Counselor Health Impact Assessment Committee would like to provide local health impact information to you, and share data from air monitors placed throughout Counselor in 2018.

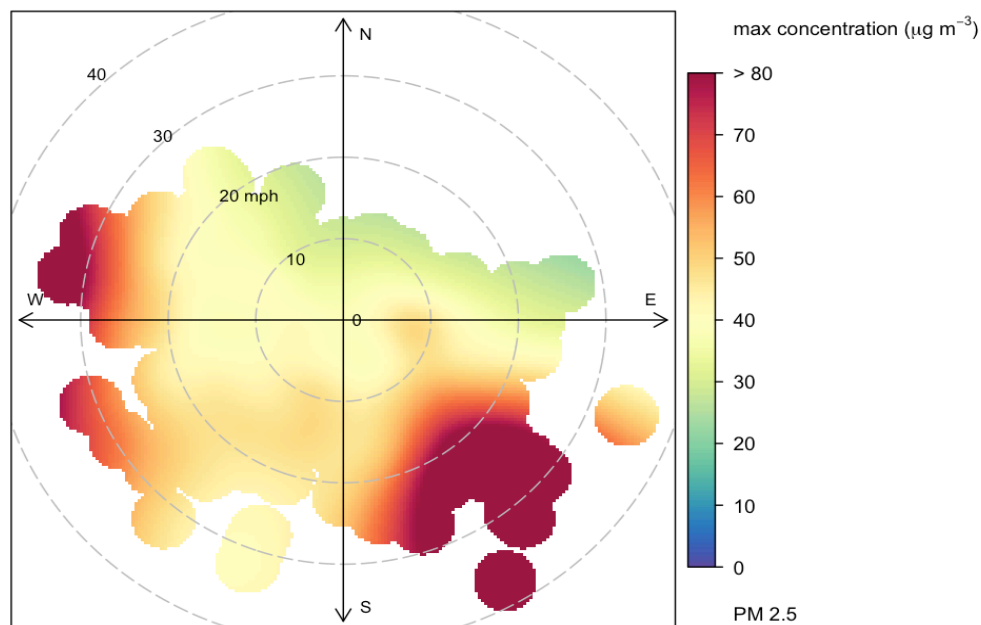
To find the air quality data recorded closest to your land, look at the 8 sites on the map below. If your land is located where it is flat and open with no hills or mesas to break up the wind currents, then it is likely that #60 (with **higher pollution** readings) could be similar to your actual location. If you live close to a hill or mesa with oil wells on the other side, then #70 (with **lower pollution** readings) could be similar to your actual location.

Residents throughout Counselor reported health symptoms that are associated with exposure to known chemicals emitted from oil and gas wells. A chart of the symptoms reported in 2018 is included along with suggestions made on how to reduce harmful exposure and keep local residents healthier.

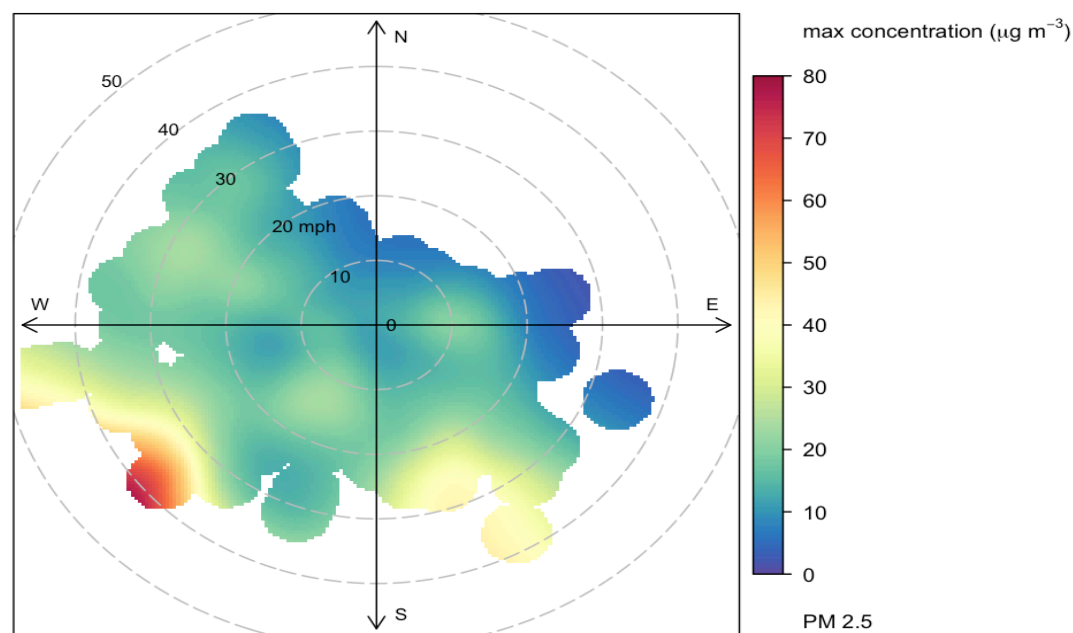
Map of 8 air monitor sites in Counselor showing oil wells and structures



Plot Map #60 Counselor Chapter House on north side of Hwy 550



Plot Map #70 Counselor segment of US 550 (nearest Nageezi Chapter) on south side of highway



What Do the Maps Measure?

Each map shows the levels of particulate matter (fine dust particles) at each of the Counselor monitoring sites. The Environmental Health Project uses a Particulate Matter Impact App which

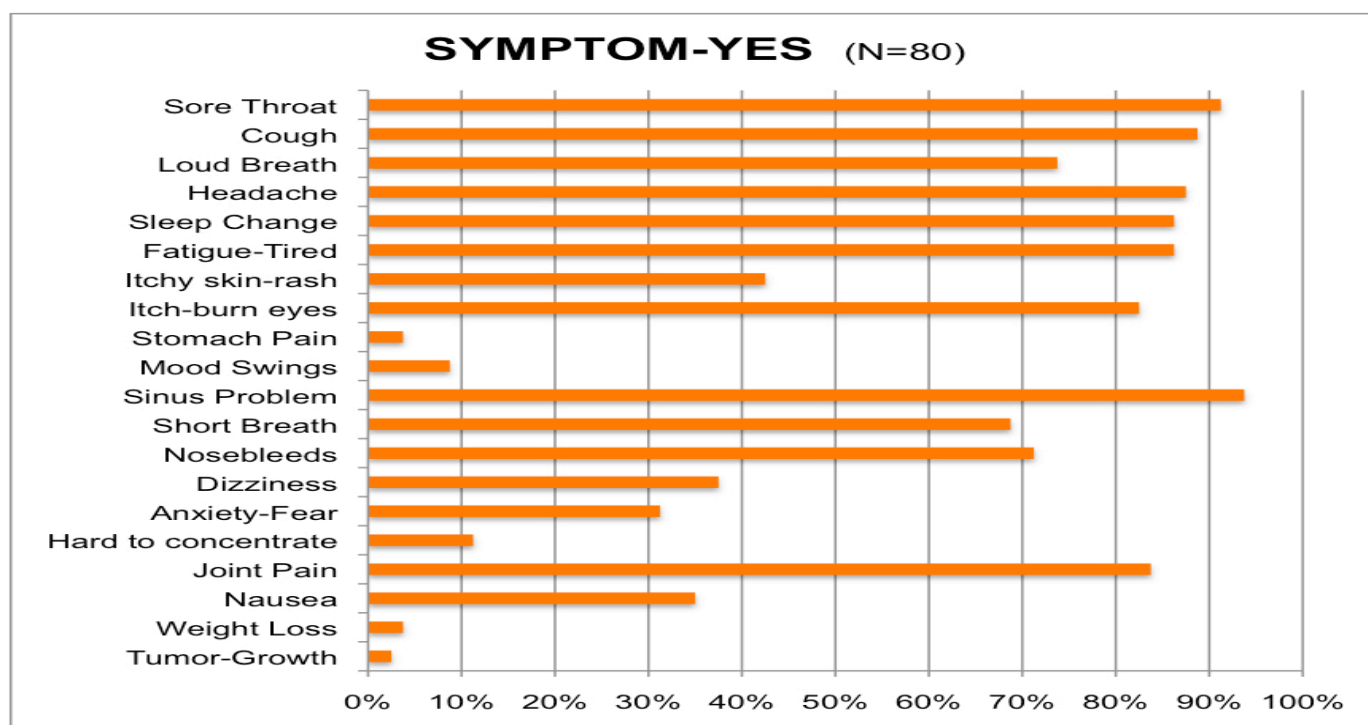
combines the Speck monitor results with local weather data to show which weather conditions bring higher levels of this pollutant to each residence. If you take a closer look at the plot maps you can see how wind direction and wind speed influence the PM_{2.5} concentrations.

Close up - each Map shows the wind speed, direction and intensity of PM_{2.5} - ranging from lowest (blue) to yellow-green (the EPA level of PM_{2.5} at 35 ug/m³ - which can impact the respiratory health of individuals), to red (the highest level of exposure and hazardous to human health).

In the plot map closest to Nageezi Chapter (#70), the colors show 1) clean (blue-green) air north of the home site where the monitor was located, 2) more contaminated (yellow) air south of the location, and 3) hazardous emissions (red) only in the southwest quadrant of the map at levels up to 80 micrograms per meter cubed (80 ug/m³). This indicates that the closest oil well is likely located southwest of the home. The map also shows the circles around the house that show wind speeds from 0 to 50 miles per hour (mph). The highest pollution occurred when winds reached 40 mph.

How can I use this information?

Health symptoms that develop from repeated or continuous exposure to emissions from oil wells and pipeline vary. Some people react quickly with severe headaches, nosebleeds, coughing and trouble breathing and sleep disturbance and feeling tired. Others may spend less time outdoors, or are away from home more, so they get less exposure and have fewer symptoms. The Health Symptom Chart below is to better understand how local residents are reporting the health symptoms they have experienced in the past year (2018) after drilling began near their home.



What toxic chemicals were found in Counselor's air and how can it affect your health?

Eight toxic Volatile (flammable) Organic Compounds (VOCs) including elevated levels of formaldehyde, were found present in the air samples from Counselor. VOCs are a varied group of compounds that can range from having no known health effects to being highly toxic. **Short-term exposure can cause eye and respiratory tract irritation, headaches, dizziness, visual disorders, fatigue, loss of coordination, allergic skin reaction, nausea, and memory impairment or inability to concentrate. Long-term effects include loss of coordination and damage to the liver, kidney, and central nervous system.** Formaldehyde – Inhaled: exposure can cause cough, sore throat, nosebleeds and eye irritation. It can cause cancer of the nose and throat and is harmful for people with asthma, bronchitis or other breathing conditions.

<https://www.cancer.org/cancer/cancer-causes/formaldehyde.html>

Many of the above symptoms caused by short-term exposure to VOCs were recorded by > 80% of adult Counselor residents that participated in the health surveys conducted from May through August in 2018 by the Counselor HIA Committee.

Public health professionals understand and report that:

- Chemical toxicity in the human body can occur within minutes or hours of exposure.
- Repeated episodic and peak exposures can increase the potential and degree of harm.
- Understanding the variables of timing and degree of exposure is essential for medical practitioners to understand the health risks.

Ways for Oil and Gas Companies to reduce your exposure to toxins from oil-gas operations

1. The most effective method to prevent toxic exposures for local residents is for oil companies to trap emissions at the source. **Emissions should be captured on site from all polluting equipment including wellheads, tanks, compressors, and pipeline valves.**
2. Companies should continuously monitor for VOCs, formaldehyde and PM_{2.5} at local schools, daycares, and homes where health-sensitive individuals are located. Develop emergency plans for these locations in the event of high exposure scenarios.
3. Establish a setback distance minimum of 1/2 mile (2640 feet) from smaller shale gas facilities, such as single wells, that emit 100 to 500 grams/hour, and a setback distance minimum of 1 1/4 mile (6600 feet) for large well complexes whose emissions exceed 1000 grams/hour.

The Counselor HIA Committee has worked closely for several years with the residents of Counselor and in 2018 with the Environmental Health Project (EHP), a public health organization working at the forefront of the nation-wide response to health impacts from oil and gas development.